104843

Health Assessment for

BLOSENSKI LANDFILL NATIONAL PRIORITIES LIST (NPL) SITE

WEST CALN TOWNSHIP, CHESTER COUNTY, PENNSYLVANIA

Agency for Toxic Substances and Disease Registry
U.S. Public Health Service

APR 10 1989

SUMMARY

The Blosenski Landfill NPL (National Priorities List) site is approximately 50 miles west of Philadelphia in West Caln Township, Chester County, Pennsylvania. Industrial and municipal wastes that contain organic compounds and heavy metals have been disposed on the property. The site is in a rural setting. There is a residence on the property, and others are adjacent to the site and in the area nearby.

The site is of potential health concern because of the risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse health effects. Contaminants, principally volatile organic compounds, have been detected at levels of potential concern in groundwater on-site and off-site, in soils on-site, in some water supply wells, and in surface water and sediments in a tributary that receives runoff from the area. Groundwater is the principal contaminated medium of concern. A temporary alternate water supply has been provided to two residences, and a permanent alternate water supply is being developed for these parties and for any other groundwater users where monitoring indicates the groundwater supply may be contaminated.

BACKGROUND

A. SITE DESCRIPTION

The Blosenski Landfill NPL site is approximately 50 miles west of Philadelphia in West Caln Township, Chester County, Pennsylvania. A Record of Decision (ROD) was prepared by the U. S. Environmental Protection Agency (EPA) in September 1986, and the Pennsylvania Department of Environmental Resources (PADER) concurred with the approved remedy.

The 13.6-acre site was operated as a landfill for the disposal of municipal and industrial wastes from the 1940's through the late 1970's. Operations reportedly included random dumping of bulk quantities of industrial wastes, sludges, municipal wastes, and commercial refuse. Wastes were not segregated, and a liner was not placed in the disposal areas. Leaking drums and tanker bodies have been observed. Solvents, paints, demolition waste, paper, and wood are included in the wastes. In 1982, 50 to 60 drums and a leaking tank truck were removed from the site. The property is not currently fenced.

The ROD describes the following elements of the remedy:

* Provide a public water supply by the Coatesville Water Authority to affected and potentially affected groundwater users. EPA estimates that 12 residences will be provided water service.

* Excavate buried drums, any liquids, and the soils or wastes immediately surrounding the drums and ship materials off-site to a facility approved for disposal of hazardous materials.

* Install additional groundwater monitoring wells and conduct pump tests to collect data for design of an effective system for pumping and treating groundwater.

* Implement a program for pumping and treating groundwater. The groundwater will be treated and either discharged to the intermittent tributary north of the site under terms of a permit issued by PADER or reinjected into the ground. The goal is to treat groundwater until contaminant concentrations in the groundwater are reduced to Alternate Concentration Levels (ACLs) developed by EPA. The levels proposed for organic compounds are presented in Table 1, in the Appendices. Target levels for metals and for tentatively identified compounds will be developed during design. If, after a period specified in design (not to exceed two years), it appears it may be difficult to achieve ACL values; a decision will be made whether to extend the program for another specified period using the proposed, or alternate, ACLs. This process will continue cycling until EPA deems it appropriate to discontinue pumping. EPA indicates that this strategy is considered necessary because the effectiveness of treating to reduce volatile organic compounds to low part per billion levels over a long time period is unknown.

* Install a low permeability cap with a gas venting system on the landfill; and, if needed, treat vented gases.

* Conduct periodic monitoring of water supply wells, monitoring wells, surface waters, and sediments.

For purposes of this Health Assessment, the Agency for Toxic Substances and Disease Registry (ATSDR) has considered off-site and on-site limits to be represented by the site boundary depicted on Figure 6-1 of the Remedial Investigation Report (RI).

B. SITE VISIT

ATSDR has not conducted a site visit to date.

ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS

A. ON-SITE CONTAMINATION

On-site monitoring of groundwater, surface soil, and air quality (within a borehole) indicates contamination with organic compounds and heavy metals. Monitoring data for contaminants considered to be of greatest potential concern are summarized in Table 2, in the Appendices.

B. OFF-SITE CONTAMINATION

Table 3, in the Appendices, summarizes monitoring data for the contaminants of greatest potential concern detected in off-site groundwater, water supply wells, surface water, and sediment. Groundwater was the only medium that was monitored both on-site and off-site. A comparison of all the monitoring well data indicates that essentially the same contaminants were detected on-site and off-site, and at generally similar concentrations. However, water supply well monitoring data indicate somewhat fewer contaminants and at much lower concentrations than were recorded at the locations of the on-site and off-site groundwater monitoring wells. The water supply wells represented by data in Table 3 include one water supply well that is located on-site near the property line.

C. PHYSICAL HAZARDS

This landfill poses a potential physical hazard because wastes with organic content may generate methane which has the potential to explode if it accumulates in an enclosure, such as beneath a landfill cap or in buildings. However, there are no methane monitoring data for the landfill with which to fully evaluate this concern.

DEMOGRAPHICS

The site is located on Kings Highway in a sparsely populated, rural area. Approximately 30 residents live within a quarter-mile of the site. There is one residence on the edge of the property by the highway, a few adjacent to the site, and a number of others along the highway. A service station is directly across the road. Residences also are along Cambridge Road, which is nearby to the northeast. A trailer park is three-quarters of a mile to the north, and a church and school are within two miles. Land uses around the site are primarily forest, pasture, and cropland. The nonresidential areas adjacent to the site are woodlands. Agricultural areas lie within one-quarter mile of the site. An intermittent, unnamed tributary of Indian Spring Run is approximately 500 feet north of the property. There are no known users of Indian Spring Run as a drinking water source. Groundwater, within a 3 mile radius of the site, is used as a drinking water source by approximately 600 people, including the persons nearest the property.

EVALUATION

A. SITE CHARACTERIZATION (DATA NEEDS AND EVALUATION)

1. Environmental Media

Investigation data gathered for site characterization have been fairly extensive. However, additional information is necessary to clarify a number of issues that may be potential health concerns.

Monitoring data are needed to determine whether airborne contaminants or contaminants transported by surface runoff have been deposited at adjacent residential properties (including garden areas, if consumable plants are grown). Also, surface soil monitoring data need to be developed at other areas around the landfill perimeter to determine whether contaminants occur at levels that pose a health concern.

It is important to define if Indian Spring Run and any portion of the tributary are used for recreation and if the tributary is used for fishing. If so, monitoring data are needed for surface water and sediment in both streams to better evaluate the potential for health concern for these uses. Since the Run is expected to be used for fishing, fish tissue monitoring is desirable if surface water or sediments are contaminated. Fish tissue analysis also is needed from the tributary if fishing is conducted there.

After the cap is in place, monitoring data is needed for off-gases at vents or the treatment system stack to determine whether releases pose a health concern. If the groundwater treatment system includes an air stripper, monitoring data also are needed for off-gases. Similarly, if treated groundwater is discharged to the tributary, the quality of this discharge needs to be monitored. After the cap has been constructed, monitoring should be conducted in adjacent residences to determine whether methane or other gases are accumulating at levels of concern.

2. Demographics and Land Use

Information available in reference materials about demographics and land use is satisfactory for this Health Assessment.

3. Quality Assurance and Quality Control

ATSDR presumes that site investigation protocols and analytical data have been reviewed by EPA and have met their acceptability criteria. The validity of the conclusions drawn in this Health Assessment is determined by the availability and reliability of the reference information.

B. ENVIRONMENTAL PATHWAYS

Contaminants associated with the wastes that have been disposed at the site have been shown by monitoring to have migrated into the soils, to the groundwater, and to nearby tributary surface water and sediment.

Wind currents crossing the existing site surface may periodically entrain volatile compounds and also contaminants sorbed to particles and transport them elsewhere on-site. Some of these airborne contaminants are likely to have migrated to nearby off-site areas, including residences and woodlands. The proposed landfill cover and vegetation should minimize particulate entrainment and volatilization from the existing landfill surface. However, if contaminants occur at important concentrations in any nearby surface soils beyond the site perimeter, some migration by air may also originate there until, or unless, remediation is effected. The cap venting system is expected to release gaseous contaminants and possibly methane to the air unless a gas treatment system is provided. However, the treatment system, too, would release some residual levels of contaminants to the air. An air stripper, if used to treat groundwater, also would release airborne contaminants. The specific compounds and their concentrations that might be released from landfill vents or from gas or groundwater treatment systems are not fully known at this time and would depend on the types and concentrations of gas and groundwater contaminants and the efficiencies of the treatment systems. Lateral movement of gases, including methane, may occur within the subsurface materials, especially through the fractured rock system. Placing a cap on the landfill is likely to increase the amount and concentration of gases that might now be migrating below ground surface if the vent and treatment systems are less efficient than the currently uncapped landfill surface at allowing soil gases to escape above ground.

Landfill wastes have released contaminants that have migrated into the shallow water-table aquifer. Evaluations indicate the hydrogeologic features of principal importance to groundwater and contaminant movement in the vicinity of the site include:

* Residual soils and saprolite materials (associated with the Piedmont Physiographic Province) extend from the ground surface to depths ranging from about 10 to 30 feet. These materials are underlain by schist and quartzite bedrock which has a joint/fracture system that strikes east-west and dips to the south.

* The groundwater table is encountered within the overburden in the eastern portion of the site and in bedrock elsewhere on the property. Where the water table was encountered in the overburden, it may represent a zone of water that is perched on an impermeable soil layer of quite limited lateral extent.

* Ground surface near the site slopes downward toward the tributary to the north.

* A east-west oriented groundwater divide may occur seasonally between the disposal area and the residences along Kings Highway, to the south.

Contaminant migration is initiated by rainwater that seeps through the contaminated soils and wastes, and liquid wastes may migrate directly to the groundwater. Contaminant migration also is induced directly by the groundwater where contaminated soils and wastes extend beneath shallow perched water that exists within some portions of the landfill.

The primary pathway for contaminant migration by groundwater movement is through the highly fractured bedrock that underlies the site. Volatile organic compounds that enter the system move in fractures and along bedding joints with little or no attenuation or adsorption of contaminants. The complex fracture system precludes accurate prediction of the specific flow path, flow rate, and extent of the contaminant plume. In general, it appears that groundwater and its entrained contaminants migrate northward from the property toward the tributary. However, at the southern portion of the disposal area; groundwater and contaminant movement may, at times, be directed southward under the influence of water supply well pumping, or a seasonal groundwater divide, or bedrock structure.

Water supply wells have been monitored in the area. Data for two of the wells have consistently shown that groundwater is contaminated with volatile organic compounds. Monitoring at some of the other water supply wells also indicate the possibility of low levels of organic compounds, but there is uncertainty because of data unreliability or inconsistent results for repeated sampling and testing. Heavy metals were detected in some water supply wells at levels that exceed the concentrations found in site groundwater monitoring wells.

Removal of buried drums and surrounding materials during remediation should reduce the quantities of contaminants that potentially are available to migrate. Over time, the proposed cap and treatment of contaminated groundwater should improve water quality. The cap should substantially reduce the amount of rainwater that enters the landfill materials. However, if contaminants at substantial concentrations occur in soils beyond the landfill, these contaminants could continue to migrate with infiltrating rainwater to the groundwater unless, or until, those contaminated soils are remediated. If, during groundwater remediation, treated water is injected into the ground rather than discharged to surface water; the injection activities would introduce some residual contaminant into the groundwater system. The concentrations of contaminants to be injected are unknown at this time and would depend upon the efficiency of the treatment system. Introduction of residual contaminants could extend the cleanup time frame or, if the concentrations injected are great enough, might preclude cleanup of groundwater to the desired health goals.

Rainfall runoff transports surficial landfill contaminants off-site and, in general, discharges to the north into a nearby unnamed intermittent tributary. Groundwater discharge is also likely to release contaminants to the tributary. Contaminants in the tributary are dissolved in the water and retained (sorbed) by suspended particles and sediments. The tributary discharges into Indian Spring Run about two miles from the site. Indian Spring Run, in turn, joins Pequea Creek which eventually flows into the Susquehanna River, approximately 30 miles southwest of the property. Surface water and sediments in Indian Spring Run are potential environmental pathways; however, there is no information to confirm whether these are contaminated. There also is no information to confirm that the Run and the tributary are used for recreation (i.e., swimming). Ground surface contours indicate that site runoff is also likely to have transported surficial soil contaminants off-site to adjacent residential properties to the south and southwest. However, there are no data to confirm that contaminants have been deposited there. The proposed cap should substantially reduce the amount of contamination transported by runoff from the property. However, if contaminants exist on the ground surface around the site periphery, these could be a continuing source of contaminated runoff to the tributary and other downgradient areas unless, or until, remediation is implemented.

PADER has designated Indian Spring Run to be protected for the maintenance and/or propagation of cold water fish species; therefore, fish are a potential environmental (i.e., food chain) pathway for contaminants. It appears, therefore, that fishing occurs in the Run, and possibly, in the tributary; but there are no monitoring data to confirm that fish tissue has been contaminated. Garden produce might be a contaminant pathway; however, there is no information to indicate whether or not nearby residents raise consumable plants. Agricultural land, located a quarter mile away, is probably too distant from the site for site releases to have an important effect on crops or animals associated with those farming operations.

C. HUMAN EXPOSURE PATHWAYS

The most important potential human exposure pathway is through groundwater which has become contaminated by site releases and is used as the potable water supply for persons residing and working in the area. A summary of human exposure pathways is provided in Table 4, in the Appendices.

PUBLIC HEALTH IMPLICATIONS

Monitoring data indicate that waste operations have released a number of organic compounds and heavy metals to environmental media through which there is a potential for exposure at concentrations that may pose a threat to human health. Based on information in referenced documents, it is reasonable to conclude that the organic compounds detected through off-site monitoring migrated from the landfill to the sampling locations.

For the metals, however, it is possible that some of the concentrations off-site are an expression of background levels rather than a result of migration.

Contaminants have been detected in groundwater monitoring wells and water supply wells on-site and off-site at levels of potential human concern through ingestion, inhalation, and direct contact. Waste cleanup, the landfill cap, and groundwater removal and treatment should substantially reduce contaminant levels in the groundwater over time; and, if reduced sufficiently, should subsequently reduce the risk to human health.

Groundwater monitoring well data indicate numerous organic compounds and some metals occur at maximum concentrations that are potentially a threat to health if they were to migrate to active water supply wells at these levels. These include benzene (11,000 ppb) (parts per billion), 1,1,1-trichloroethane (430 ppb), arsenic (14 ppb), 1,2-dichloroethane (74 ppb), tetrachloroethene (25 ppb), trichloroethene (68 ppb), 1,2-dichloroethene (870 ppb), 1,1-dichloroethene (21 ppb), vinyl chloride (450 ppb), chloroform (270 ppb), and lead (5.9 ppb). These concentrations (except for arsenic and lead) exceed EPA's Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs). These contaminants can be absorbed orally. Benzene also will readily volatilize from aqueous media and is well absorbed by the inhalation route. Benzene is a known human carcinogen and is considered to be carcinogenic by all routes of exposure. Benzene also induces a variety of noncarcinogenic, hematologic toxicities following low-level, chronic exposure. Exposure to 1,1,1-trichloroethane may depress the central nervous system and adversely affect a number of body organs. 1,2-Dichloroethane has been noted to cause liver and kidney damage and has been defined by EPA as a probable human carcinogen. Tetrachloroethene is also a probable human carcinogen and can cause central nervous system depression and hepatic injury. Trichloroethene is readily volatilized, is well absorbed by all exposure routes, has been classified by EPA as a probable carcinogen, and can be a hepatic toxicant following long-term oral or inhalation exposure. 1,1-Dichloroethene has been classified by EPA as a possible human carcinogen. Vinyl chloride is a human carcinogen and may cause nervous system depression and hepatic damage. Chloroform also is a suspected carcinogen and can affect liver and kidneys. Arsenic, is a human carcinogen by the oral exposure route and can induce a variety of skin disorders, including hyperpigmentation and hyperkeratosis. Chronic oral lead exposure induces neurological, hematological, and renal toxicities, with the neonate and young being particularly sensitive to the neurological effects of chronic exposure. These concerns for lead have caused EPA to consider the advisability of reducing its threshold level of concern for lead in drinking water to 5 ppm.

Monitoring of domestic water supplies has shown that groundwater at two wells supplying the residence on-site and an adjacent residence off-site consistently had organic compound contaminants at levels of health

concern. These residents have been provided a temporary alternate water supply. More specifically, trichloroethene was detected in one well at levels as high as 29 ppb and in the other to 260 ppb. Monitoring at a number of the other water supply wells has provided inconclusive indications of volatile organic compounds and their concentrations; hence, no definite threat can be determined. Some of the heavy metals monitoring data also are inconclusive. However, lead and cadmium have been detected in one water supply well at concentrations (26 and 11 ppb, respectively) that pose a potential concern for human health. Chronic oral exposure to cadmium can induce renal toxicity. Arsenic, too, has been detected (maximum 15 ppb) at a level that may be a health concern. The ROD provides for continuing periodic monitoring of water supply wells, and a permanent alternate water supply system is being developed for users whose well water is found to be contaminated.

Groundwater contamination will continue to be a potential human health concern for at least until the permanent alternate water supply system is in place and affected groundwater users are connected to it. Similar public health concerns exist for other groundwater well users in the area who may be impacted by future migration of groundwater contaminants. However these concerns should be mitigated by periodic monitoring of active water supply wells in the area to identify additional exposures and by site remediation activities which should substantially reduce contaminant concentrations.

Site intruders or remedial workers, if unprotected, may be exposed through ingestion, dermal contact, and inhalation to contaminated soils on-site for which monitoring data indicate there are a number of contaminants at levels that pose a health concern. These include high-molecular weight polynuclear aromatic hydrocarbons (PAH's) detected at levels up to 7,000 ppb and Aroclor 1260, a polychlorinated biphenyl (PCB), detected at an estimated maximum concentration of 53,000 ppb. These high-density PAH's are suspected human carcinogens; the PCB has been classified by EPA as a probable human carcinogen and can induce liver damage. Arsenic (23,000 ppb), lead (1,720,000 ppb), and cadmium (280,000 ppb) are also at levels of health concern. The proposed drum removal and cap construction should substantially reduce the potential for intruder exposure to surface soil contaminants. There is also a potential for contaminated soils to occur on the site periphery in woodlands and residential property. However, no definite health implication can be determined because data for these soils are not available.

Off-site, if there are recreational users (i.e., swimming, wading) of the tributary or Indian Spring Run, there is some possibility ingestion, inhalation, or dermal exposure to contaminants in surface water and sediments at levels of human health concern. In the tributary, chloroform (4 ppb) and 1,1-dichloroethene (9 ppb) were found to exceed EPA's water quality criteria for consumption of water and aquatic organisms, and arsenic is in evidence in the sediment (11,000 ppb). However, there are no data for water or sediment quality for the Run.

Remediation of contaminated groundwater, drum removal, and cap construction should reduce the future potential for site-related contaminants to reach the tributary and Indian Spring Run. However, if treated groundwater is discharged to the tributary, some of the residual contaminants would be transported by the surface water or sorbed by the sediment. The concentration limits for contaminants in treated groundwater have not been established at this time; hence, their influence on health concerns cannot be determined. Also, as previously discussed, the potential exists for contamination of surface soils at the site periphery; these could continue to be transported by runoff to the tributary where they might pose a human health concern.

Intruders, nearby residents, and unprotected remedial workers may inhale and ingest airborne contaminants originating from the disposed wastes and contaminated soils. Further air-related exposure to organic compounds could occur, after remediation begins, from vented off-gases or if air stripping is used to treat groundwater. Monitoring conducted at a borehole detected a number of gases, including benzene, 1,1,1-trichloroethane, trichloroethene, 1,2-dichloroethene, and chloroform. However, the data probably do not reliably indicate the concentrations to which persons would be exposed, hence specific health conclusions can not be drawn until remediation is underway and monitoring data are available. Methane poses a potential threat of physical harm because it can be explosive if it accumulates at critical concentrations. The landfill cap conceivably can increase the potential for methane (and other gases) to migrate laterally through the subsurface soil or rock and collect in residences if the cap (including venting and possible gas treatment systems) restricts the extent to which gases escape upward to the ground surface. Reference documents do not indicate the levels of methane and other gasses that might migrate laterally below ground and accumulate in residences; hence, conclusions regarding explosion danger or health concerns cannot be developed.

Consumption of fish from the tributary or Indian Spring Run provides a potential pathway for contaminants released from the site. However, there is no information that indicates whether or not fish are consumed from the tributary or if contaminant levels in fish in either stream pose a potential concern to human health. Likewise, there is no information to indicate whether or not nearby residents grow consumable plants, and, if so, whether contaminant levels in the plants would be at levels of concern.

CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

This site is of potential health concern because of the risk to human health resulting from possible exposure to hazardous substances at

concentrations that may result in adverse health effects. As noted in the Human Exposure Pathways section above, human exposure to a number of contaminants may be occurring. The contaminants of concern are principally volatile organic compounds but include a few PAH's, PCB's, and heavy metals.

Area residents possibly are exposed to contaminants in their water supply via ingestion, dermal contact, and inhalation at levels of concern to human health. However, a temporary alternate supply has been provided at two residences where monitoring of water supply wells consistently showed contaminants at levels of concern. A permanent alternate water supply system is being installed. The two residences with a temporary water supply and a number of the potentially affected groundwater users will be connected to the system initially, and others would be added if continued periodic monitoring indicates there is a need to do so.

Intruders and future remedial workers (if not adequately protected) may be exposed to contaminants in on-site soil and waste through ingestion, dermal contact, and inhalation at levels that pose a concern for human health. If contaminants have migrated to soils at nearby residences (including garden areas, if consumable plants are grown), or to other points beyond the landfill periphery; persons possibly are exposed by ingestion, dermal contact, and inhalation at these locations. Monitoring data for these locations are not available; hence, potential health concerns cannot be evaluated.

Intruders and nearby residents also might be exposed to airborne contaminants at levels of concern to health, depending on the contaminant concentrations released from land fill vents, or from gas treatment equipment, or from the groundwater treatment equipment. Once the landfill cap is in place there could be a greater potential for methane and other gases to migrate laterally through subsurface formations and collect in residences. If this occurs, there is a potential concern for explosion and for inhalation exposure to other gases. If persons use the tributary and/or Indian Spring Run for recreation or fishing, they may be exposed to contaminants in sediments, surface water, and fish tissue through ingestion, dermal contact, and inhalation. Much of the monitoring data needed to evaluate health concerns related to the Run and Tributary are unavailable.

The proposed remediation plays a major role in protecting and minimizing the risk to human health. Important elements include providing alternate water supplies to those whose well water supply is indicated to be contaminated, continued monitoring of water supply wells, and groundwater remediation. The criteria for determining if a groundwater user would be provided an alternate water supply is not described in the ROD; therefore, a specific conclusion regarding the effectiveness of protecting health cannot be developed. The remediation activities may result in migration of airborne particulate and volatile contaminants to adjacent residences, including releases to the air from cap vents, or from air treatment

equipment, or from groundwater treatment processes. Treated groundwater also might be discharged into the tributary which flows into Indian Spring Run. Elevated contaminants in that location could increase concerns for human health if these waters are used for recreation and fishing.

B. RECOMMENDATIONS

1. In accordance with CERCLA as amended, the Blosenski Landfill NPL Site, Chester County, PA has been evaluated for appropriate follow-up with respect to health effects studies. Although there are indications that human exposure to on-site and off-site contaminants has occurred in the past, this site is not being considered for follow-up health studies at this time because there is no evidence that exposure is currently occurring and there are no tests to evaluate past exposure. However, if data become available suggesting that human exposure to significant levels of hazardous substances is currently occurring, ATSDR will re-evaluate this site for any indicated follow-up.

2. ATSDR concurs with the need to continue periodic monitoring at water supply wells in the site vicinity to determine if groundwater at these locations has been contaminated. ATSDR also concurs with the need to provide alternate water supplies where contamination is indicated at levels of health concern. The decision to provide an alternate water supply should consider appropriate health criteria for organic compounds and also metals. At water supply wells where data are found to be inconclusive, supplemental monitoring may be appropriate.

3. ATSDR concurs with the proposed additional monitoring of surface water and sediments. If Indian Spring Run and the tributary both are used for recreation and/or fishing, each should be monitored. If contaminant concentrations at these locations indicate a potential for contamination of fish, fish tissue should be monitored to determine whether contaminants occur at levels that pose a health concern. If fish are consumed from the tributary, samples of their tissue also may need to be analyzed.

4. Monitoring data are needed for surface soils at adjacent residential properties (including garden areas, if consumable plants are raised) to determine whether contaminants have migrated there at levels that might pose a health concern. Monitoring data also are needed at other points around the site perimeter to determine whether contaminants have migrated there at levels of concern to public health.

5. Provide a means to prevent unauthorized entry onto the landfill area until, or unless, remedial measures have eliminated pathways through which intruders might be exposed to contaminant levels of health concern.

6. Conduct real-time air quality monitoring to determine whether gas releases from vents, or gas treatment facilities, or groundwater treatment equipment are likely to expose persons on-site or off-site to unacceptable levels of contaminants in the air.

7. After the cap is in place, monitoring should be conducted in adjacent residences to determine whether methane or other gases are migrating and accumulating there at levels that pose health or physical injury concerns.

8. If treated groundwater is discharged to the tributary, water quality monitoring of the discharge is needed to determine if discharge contaminant levels are below those of health concern.

9. Require remedial workers to adhere to applicable regulations and recommendations outlined by the Occupational Safety and Health Administration and National Institute for Occupational Safety and Health to ensure that these workers are not exposed to unacceptable levels of site contaminants.

PREPARERS OF REPORT

Environmental Reviewer:	Don Gibeaut Environmental Health Engineer Environmental Engineering Branch
Typist:	Charlotta V. Gavin Clerk Typist Environmental Engineering Branch

REGIONAL REPRESENTATIVE

Regional Representative:	Nick Dinardo Public Health Advisor Field Operations Branch Region III

REFERENCES

1. NUS Corporation, 1985, Remedial Investigation Report (Draft), Blosenski Landfill Site

2. NUS Corporation, Feasibility Study Report (Draft), Blosenski Landfill Site

3. USEPA, 1896, Record of Decision, Remedial Alternative Decision, Blosenski Landfill

4. ATSDR Files

APPENDICES

TABLE 1

PROPOSED GROUNDWATER REMEDIATION CONCENTRATIONS - ppb

CONSTITUENT	
Benzene	0.70
1,1,1-Trichloroethane	22
1,2-Dichloroethane	0.95
Trichloroethene	1.8
1,2-Dichloroethene	70
1,1-Dichloroethene	0.24
Vinyl Chloride	0.015
Chloroform	0.19
Xylene	440
Toluene	2000
Ethylbenzene	680
Phenols	300
Phthalates	3

Criteria for metals and for tentatively identified compounds will be developed during design.

TABLE 2

ON-SITE CONTAMINANTS OF POTENTIAL CONCERN - ppb

CONSTITUENT	GROUNDWATER	SURFACE SOILS	AIR(c)
Benzene	ND - 11,000	ND - NQ	0.022
1,1,1-Trichloroethane	ND - 210	ND - 390	0.091
1,2-Dichloroethane	ND	ND	ND
Tetrachloroethene	ND - 25	ND	ND
Trichloroethene	ND - 74	ND - 6.9	0.063
1,2-Dichloroethene	ND - 160	ND - 29	0.067
1,1-Dichloroethene	ND - 11	ND	0.009j
Vinyl Chloride	ND - 110	ND	ND
Chloroform	ND - 110	ND	0.053
PAH (High Density) (a)	ND	ND - 7,000	NA
PCB (b) Aroclor 1260	ND	ND - 53,000j	NA
Arsenic	ND - 14	NQ - 23,000	NA
Lead	ND - 5.9	NQ - 1,720,000	NA
Cadmium	ND - 5.6	ND - 280,000	NA

Sampling conducted 1984, 1985
NA - no analysis
ND - not detected
NQ - not quantifiable
a - high molecular weight polynuclear aromatic hydrocarbons
b - polychlorinated biphenyls
c - one sample analyzed, extracted from borehole
j - estimated value

TABLE 3

OFF-SITE CONTAMINANTS OF POTENTIAL CONCERN - ppb

	GROUNDWATER	
CONSTITUENT	MONITORING WELLS	RESIDENTIAL WELLS(d)
Benzene	ND - 3,300j	ND - 14
1,1,1-Trichloroethane	ND - 430	ND - 26
1,2-Dichloroethane	ND - 74	ND
Tetrachloroethene	ND	ND - NQ
Trichloroethene	ND - 68	ND - 260
1,2-Dichloroethene	ND - 870	ND - 18
1,1-Dichloroethene	ND - 21j	ND
Vinyl Chloride	ND - 450j	ND
Chloroform	ND - 270j	ND - 2j
PAH (High Density)	ND	ND
PCB	ND	ND
Arsenic	ND - 11	ND - 15
Lead	ND - 5	ND - 26
Cadmium	ND - 6.3	ND - 11

CONSTITUENT	SURFACE WATER (e)	SEDIMENT (e)
Benzene	ND	ND
1,1,1-Trichloroethane	ND - NQ	ND
1,2-Dichloroethane	ND	ND
Tetrachloroethene	ND	ND
Trichloroethene	ND - 18 (f)	ND
1,2-Dichloroethene	ND - 3j	ND - 5j
1,1-Dichloroethene	ND - 9	ND
Vinyl Chloride	ND	ND
Chloroform	ND - 4	ND
PAH (High Density)	ND	ND
PCB	ND	ND
Arsenic	ND - <9	3,300 - 11,300
Lead	ND - 7.9	ND - 15,000
Cadmium	NQ - 2.3	ND - 2,600

Sampling conducted 1984, 1985
NA - no analysis
ND - not detected
NQ - not quantifiable
j - estimated value
< - less than
d - one well is on-site near edge of property
e - samples taken from intermittent tributary of Indian Run Spring
f - detected only at a seepage point on a slope by the landfill; compound was not detected in the tributary

TABLE 4

HUMAN EXPOSURE PATHWAYS

MEDIA	POTENTIAL EXPOSURE POINTS	EXPOSURE ROUTES OF CONCERN [Y/N][E]
SOIL	ON-SITE * Intruders onto property possibly exposed. Proposed capping measures should reduce potential for future exposure.	Y * Ingestion, dermal contact.
	* Remedial workers, if unprotected, possibly exposed.	Y * Ingestion, dermal contact.
	OFF-SITE * Persons at adjacent residences possibly exposed to contaminants that may have migrated from the site to the soil by air or runoff. Proposed capping should reduce potential for releases to off-site areas; and, with time, the contaminant concentrations in off-site areas and the potential for exposure may diminish.	Y * Ingestion, dermal contact.
GROUND WATER	ON-SITE * An on-site residential water supply well has been replaced with a temporary alternate water supply, and a permanent alternate water supply is being developed. Therefore, no current exposure.	N * Not a current environmental pathway, no likely current exposure routes (future water-supply well installation unlikely).
	OFF-SITE * Persons in the vicinity use groundwater for drinking and household purposes and possibly are exposed. A permanent alternate water supply system is being provided to those where well water monitoring has shown indications of possible contamination. One residence at which well water monitoring consistently showed contaminants already have been provided a temporary alternate supply. With time; buried drum removal and capping, along with groundwater withdrawal and treatment and continuing monitoring of water supply wells, should reduce the potential for exposure to those still using groundwater for potable and household uses.	Y * Ingestion, dermal contact, inhalation.

Table Continued --

TABLE 4
(Continued)

MEDIA	POTENTIAL EXPOSURE POINTS	EXPOSURE ROUTES OF CONCERN [Y/N][E]
SURFACE WATER, SEDIMENT	ON-SITE * No surface water bodies or sediment on-site, no current exposure.	N * Not a current environmental pathway, therefore, no exposure routes.
	OFF-SITE * Persons using the tributary or Indian Spring Run for fishing or recreation possibly would be exposed. Also, adjacent residential properties to the south and southwest may have received contaminated runoff. If treated groundwater is discharged to the tributary, the residual contaminants would reside in the surface water and sediment downstream. After the proposed waste cleanup and capping and groundwater remediation measures are completed, contaminant releases releases to surface water and sediment and to adjacent residential property should be reduced. Over time, the concentrations of many contaminants, and the potential for exposure should diminish.	Y * Ingestion, dermal contact, inhalation.
AIR	ON-SITE * Intruders possibly exposed to airborne contaminants and methane from the ground surface, and from vents after remediation. Proposed waste cleanup, capping, and treatment of vented gases, if necessary, should reduce the potential for exposure.	Y * Inhalation, ingestion (contaminants). Explosion, physical injury (methane).
	* Remedial workers, if unprotected, possibly will be exposed to particulate and volatile contaminants and methane during cleanup, capping, and development and operation of gas treatment system (if needed).	Y * Inhalation, ingestion (contaminants). Explosion, physical injury (methane).

Table Continued --

TABLE 4
(Continued)

MEDIA	POTENTIAL EXPOSURE POINTS	EXPOSURE ROUTES OF CONCERN [Y/N][E]
	OFF-SITE * Persons on nearby property possibly are exposed to airborne contaminants and methane, and increased exposure possibly could occur during remediation. Proposed waste cleanup, capping, and any necessary treatment of vented gases should reduce the potential for exposure.	Y * Inhalation, ingestion
	* Adjacent residents possibly may be exposed to methane and contaminant gases transported through the subsurface into their homes. After remediation is complete, residents possibly could be exposed to reduced concentrations of these gasses through the subsurface, but this will depend on the effectiveness of the vent and treatment system (if treatment is conducted).	Y * Inhalation (contaminants), physical harm--explosion (methane).
FOOD CHAIN	ON-SITE * No likely exposure.	N * Not a current environmental pathway, no exposure routes.
	OFF-SITE *Persons consuming fish taken from downgradient surface waters and consumable plants grown at adjacent residences possibly might be exposed. Over time, proposed waste removal and capping measures should reduce the potential for exposure.	Y * Ingestion.

Note[E]: Y = Route(s) potentially a concern
N = Route(s) not of concern